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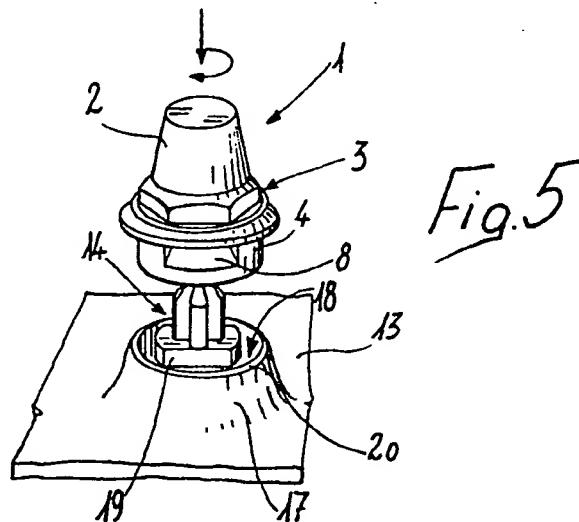
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④ Replaceable stud for sports shoes, particularly for soccer shoes.

⑤ A replaceable stud comprises an axial cavity in which a pin (14) can be inserted; the pin is separate and is rigidly associated with the sole (13) of the shoe and protrudes from a base which has an annular raised portion (17) which surrounds it coaxially and is adapted to embrace the base (4) of the stud (1). The pin has a flange (19) with a profile in the shape of a circle from which two opposite circular segments are missing, and is shaped complementarily to the base portion of the axial cavity. The flange is adapted to accommodate, when the pin is inserted, in a middle portion of the cavity, the shape whereof allows a partial rotation of the stud with respect to the pin, providing the mutual engagement of the parts. Opposite radial wings, adapted to engage, upon the partial rotation of the stud, in adapted seats of the base thereof, providing a bayonet-like engagement, may extend from the annular raised portion.



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## REPLACEABLE STUD FOR SPORTS SHOES, PARTICULARLY FOR SOCCER SHOES

The present invention relates to a replaceable stud for sports shoes, particularly for soccer (European football) shoes.

It is known that some types of sports shoes, such as soccer and rugby shoes, are provided with studs on their soles in order to increase the grip on the ground.

The above described shoes are currently provided with various kinds of stud: some are fixed, since they are embedded in the sole, and some are monolithic therewith; others are replaceable and generally use screw coupling systems.

In particular, screw couplings provide an internally threaded cylindrical washer which is embedded in the sole and in which the complementarily threaded stem of a stud is screwed by means of particular tools.

This entails the disadvantage that if the stud breaks at its base, the threaded stem remains screwed in its seat with no possibility of extracting it and therefore replacing it.

In another kind of system for coupling the stud and the sole, wings protrude radially from a stem extending axially from the base of the stud and a cylindrical seat is provided inside the sole.

The seat is provided, at its top, with two opposite raised portions which allow to insert the stem with said wings and to subsequently partially rotate said stud so as to engage the parts.

Elements for preventing rotation of the stud are provided inside the seat.

Such a coupling system, however, is not free from disadvantages, including one which is particularly considerable and is due to the fact that the lateral stresses charge exclusively the coupling cross section of the stem at the base, which is very small and therefore highly susceptible to breakage.

In this case too, it is impossible to extract a broken stem from the seat.

The aim of the present invention is to eliminate the disadvantages described above in known types by providing replaceable studs for sports shoes which, despite being rapidly and easily replaceable, have improved resistance to lateral stresses.

A consequent primary object is to provide replaceable studs that can be easily replaced directly by the user.

Another object is to provide replaceable studs which are easy to produce and have a modest cost.

Not least object is to provide replaceable studs the manufacture whereof entails no productive complications with respect to current ones and for which current systems can be used.

This aim, these objects and others which will

become apparent hereinafter are achieved by a replaceable stud for sports shoes, particularly for soccer (European football) shoes, characterized in that it comprises an axial cavity in which a pin is insertable, said pin being rigidly associated with the sole of a shoe, said pin protruding from a base with an annular raised portion which encircles it coaxially, said raised portion being adapted to embrace the base of said stud, said pin having a flange the profile whereof is substantially in the shape of a circle from which two opposite circular segments have been removed, said profile being shape complementarily to the base portion of said cavity, said flange being adapted to accommodate, upon the insertion of said pin, in a middle portion of said cavity, the shape whereof allows a partial rotation of said stud with respect to said pin, providing the mutual coupling of the parts.

Advantageously, opposite radial wings extend inward from said annular raised portion and are adapted to engage, upon said partial rotation of the stud, in adapted seats of its base, providing a bayonet-like coupling.

Further characteristics and advantages of the invention will become apparent from the detailed description of two embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of a first embodiment of a stud according to the invention;

figure 2 is a longitudinally sectioned perspective view of the stud of figure 1;

figure 3 is a perspective view of the pin for coupling the stud of figure 1 to the sole;

figure 4 is a perspective view of the pin of figure 3 in its seat in the sole;

figure 5 is a perspective view of the stud of figure 1 in the step of coupling to the sole;

figure 6 is a sectional view, taken along a plane which is orthogonal to the axis of its base, of the stud of figure 1 which is coupled to the pin, in the step preceding the securing between the parts;

figure 7 is a perspective sectional view of the stud of figure 1 locked in its seat in the sole;

figure 8 is a perspective view of a second embodiment of a stud according to the invention;

figure 9 is a longitudinally sectional perspective view of the stud of figure 8;

figure 10 is a perspective view of the element for coupling the stud of figure 8 to the sole;

figure 11 is a longitudinally sectional perspective view of the element of figure 10;

figure 12 is a longitudinally sectional perspective view of the stud of figure 8 coupled to the sole;

figure 13 is a perspective view of the stud of figure 8 during the step of coupling to the sole;

figure 14 is a sectional view, taken along the plane XIV-XIV of figure 12, in the step preceding the mutual locking of the parts;

figure 15 is a sectional view, taken along a plane XV-XV, of the stud of figure 8 in the step preceding the mutual locking of the parts;

Figure 16 is a perspective sectional view of the stud of figure 8 locked within its seat in the sole.

With reference to the above described figures 1 to 7, a replaceable stud for sports shoes is generally indicated by the reference numeral 1 and has a substantially frustum-shaped end portion 2 adapted to interact with the ground, a middle portion 3 shaped so as to constitute a grip element for a tool, and a cylindrical base 4 with a smaller diameter than said middle portion 3.

Said stud 1 is axially provided with an axial cavity 5 which extends from its base 4 to the inside of the frustum-shaped portion 2.

According to the invention, said cavity 5 has a base portion 6 with a substantially circular profile from which two opposite circular segments are missing, and a middle portion 7 which constitutes in practice an expansion of the base portion 6, continues in the circular perimetric parts and extends into two transverse slots, respectively 8 and 9, which are open toward the outside of the base 4 and are located at the planar regions of the perimeter of said base portion 6.

Each slot 8 and 9 is conveniently shaped, on diametrically opposite end positions, so as to define a tooth, respectively indicated by 10 and 11, on the portion 7.

Said cavity 5 ends with a cylindrical end portion 12.

Given its particular shape and structure, the stud 1 can be produced by injection-molding in thermoplastic materials, either monolithically or with a portion 2 constituted by a metallic insert embedded in the rest of the structure.

According to the invention, a pin rigidly associated with the sole 13 of the shoe and generally indicated by the reference numeral 14, is insertable in said cavity 5.

More in detail, said pin 14 comprises a disk-like base 15 inserted in a complementarily shaped seat of said sole 13 on the part which is subsequently arranged internally and is closed by the mid-sole; said base is provided with radially arranged notches 16 so that it cannot be extracted or rotated.

Said substantially cylindrical pin 14 extends axially to said base 15 and is again axially encircled by a raised portion 17 of the sole 13 so as to define a cylindrical annular seat 18 which is equal

in height to said base 4 of the stud 1.

Said pin 14, which is equal in height to the length of said cavity 5, is furthermore provided, in a middle region corresponding to said portion 7 of said cavity, with a flange 19 which is shaped complementarily to the profile of said portion 6 and therefore passes through said portion 6 until it accommodates in said portion 7.

The particular configuration of said cavity portion 7 allows the stud 1 to rotate through approximately one quarter of a turn, as indicated by the arrows of figure 6, so that said flange locks between the slots 8 and 9 and engages the parts.

It should be furthermore noted that said raised portion 17 of the sole 13 is provided, at the top, with a planar portion 20 in which the middle portion 3 of the stud 1 rests upon coupling.

As illustrated in figure 5, the stud 1 is mounted as follows: it is initially inserted on the pin 14, ensuring that the base portion 6 of the cavity 5 is arranged so as to be complementary to the flange 19, and a half-rotation of the stud is then performed by means of an appropriate tool, locking said stud.

Such a technical configuration allows the stud 1 to be more rigidly locked to the sole 13 than currently known types; it has in fact an improved resistance to lateral stresses, since it has both an inner grip on the pin 14 and an outer grip on the raised portion 17.

Its base furthermore has no sharp reductions in cross section which weaken its structure.

With reference now to the above described figures 8 to 16, a replaceable stud for sports shoes is generally indicated by the reference numeral 101 in a second embodiment, and comprises a substantially frustum-shaped end portion 102 adapted to interact with the ground, a middle portion 103 provided with notches adapted to constitute grip elements for a rotation tool and a cylindrical base 104 which is smaller in diameter than said portion 103.

Said stud 101 is provided with an axial cavity 105 which extends from its base 104 to the inside of the frustum-shaped portion 102.

Similarly to the preceding embodiment of the stud, said cavity 105 has a base portion 106 which has a substantially circular profile from which two opposite circular segments are missing, and a middle portion 107 which in practice constitutes a widening of said base portion 106, continues in the circular perimetric parts and extends into transverse slots, respectively 108 and 109, which are open toward the outside of the base 104 and are located at the planar regions of the perimeter of said base portion 106.

In this case, too, each slot 108 and 109 is shaped, at diametrically opposite end positions, so as to define a tooth, respectively indicated by 110

and 111, on the portion 107.

Said cavity 105 ends with a cylindrical end portion 112.

A pin 113 rigidly associated with the sole 114 of the shoe is insertable in said cavity 105.

More in detail, said pin 113 comprises a disk-shaped base 115 which is inserted in a complementarily shaped seat 117 of the sole 113 on the side which is subsequently closed by the mid-sole.

Said base 115 has four substantially L-shaped tabs 118 arranged in a cross which insert in complementarily shaped seats of the sole, preventing the rotation of said pin 113.

An annular raised portion 119 extends orthogonally from said disk-like base 115 and is inserted in a complementarily shaped portion of said seat 117; said raised portion has two opposite radial wings 120 and 121 adapted to engage, upon the partial rotation of the stud 101, appropriate seats 122 and 123 of its base 104, providing a bayonet-like coupling.

Said substantially cylindrical pin 113 extends axially from said base 115 and is again axially encircled by a raised portion 124 of the sole 114 which continues the wall of said raised portion 119 so as to define an annular seat for said base 104 of said stud 101.

The annular top 125 of said raised portion 124 is conveniently tapered and inserts in a complementarily shaped seat 126 defined in the middle portion 103 of the stud 101 in which an annular seat 127 is also provided for a water-tight sealing ring 128, for example of the O-ring type.

The pin 113, which is equal in height to the length of said cavity 105, is provided, at the middle region which corresponds to said portion 107 of the cavity, with a flange 129 which is shaped complementarily to the profile of said portion 106 and therefore passes through said portion 106 until it accommodates in said portion 107.

The configuration of said cavity portion 107 allows the stud 101 a rotation through approximately one quarter of a turn which corresponds to the rotation described above for the bayonet-like coupling, so that said flange locks between the slots 108 and 109 and engages the parts.

As can be seen in the figures, said flange 129 is arranged orthogonally to said wings 120 and 121, and the seats of said flange and of said wings are preset so that the two coupling systems do not interfere.

The stud 101 is mounted in the same way as the previous one, by inserting it in the pin 113 and rotating it until it locks.

In practice it has been observed that the invention has brilliantly achieved the intended aim and objects.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

5 All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

10 Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

20 1. A replaceable stud for sports shoes, particularly for soccer (European football) shoes, characterized in that it comprises an axial cavity (5,105) in which a pin (14,113) is insertable, said pin being rigidly associated with the sole (13,114) of a shoe, said pin protruding from a base (15,115) with an annular raised portion (17,117) which encircles it coaxially, said raised portion being adapted to embrace the base of said stud (1,101), said pin (14) having a flange (19,129) the profile whereof is substantially in the shape of a circle from which two opposite circular segments have been removed, said profile being shaped complementarily to the base portion of said cavity, said flange being adapted to accommodate, upon the insertion of said pin, in a middle portion (7, 107) of said cavity (5,105), the shape whereof allows a partial rotation of said stud with respect to said pin, providing the mutual coupling of the parts (1,14,101,113).

25 2. Replaceable stud according to claim 1, characterized in that said stud has a substantially frustum-shaped end portion (2) adapted to interact with the ground, a middle portion (3) shaped so as to constitute a tool for rotation and a cylindrical base (4) with a smaller diameter than said middle portion.

30 3. Replaceable stud according to one or more of the preceding claims, characterized in that said annular raised portion (17) adapted to embrace said stud is provided with a flange (19), having opposite radial wings which extend inward and are adapted to engage, upon said partial rotation of said stud, in adapted seats (6) of its base (4), providing a bayonet-like coupling.

35 4. Replaceable stud according to one or more of the preceding claims, characterized in that said axial cavity (5) extends in said stud from said base to the inside of said frustum-shaped portion (2),

said cavity having, besides said base and middle portions, a cylindrical end portion (12) adapted to accommodate the protruding part of said pin (14).

5. Replaceable stud according to one or more of the preceding claims, characterized in that said pin (14) comprises a disk-like base (15) which is inserted in a complementarily shaped seat of said sole (13) on the side which is subsequently closed by the mid-sole, said disk-like base having grip notches (16) or tabs which are arranged radially, said pin being substantially cylindrical and extending axially from said disk-like base.

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6. Replaceable stud according to one or more of the preceding claims, characterized in that a raised portion (17) of the sole coaxially embraces said pin and defines, around said pin, a cylindrical annular seat (18) for the accommodation of a corresponding base of a stud, said raised portion having an annular top (20) for supporting said middle portion of said stud.

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7. Replaceable stud according to one or more of the preceding claims, characterized in that in the connecting region (125) between said base of said stud (101) and said middle portion (103), there is a seat for a water-tight sealing ring (128).

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8. Replaceable stud according to one or more of the preceding claims, characterized in that said middle portion (107) of said cavity (105) of said stud constitutes an expansion of said base portion (106) which is shaped complementarily to said flange (129) of said pin (113), said middle portion continuing said base portion in the circular perimeter parts and extending into two transverse slots (108,109) which are open toward the outside of said base of said stud and are located at the planar regions of the perimeter of said base portion of said cavity.

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9. Replaceable stud according to one or more of the preceding claims, characterized in that each of said slots (108,109) is shaped, on diametrically opposite end positions, so as to define a stop tooth (110,111) on said middle portion (107) of said cavity (105).

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10. Replaceable stud according to one or more of the preceding claims, characterized in that said partial rotation of said stud (101) with respect to said pin (113) locates said flange between said slots of said middle portion of said cavity.

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11. Replaceable stud according to one or more of the preceding claims, characterized in that said flange (129) is arranged orthogonally with respect to said wings (108,109) which extend from said annular raised portion.

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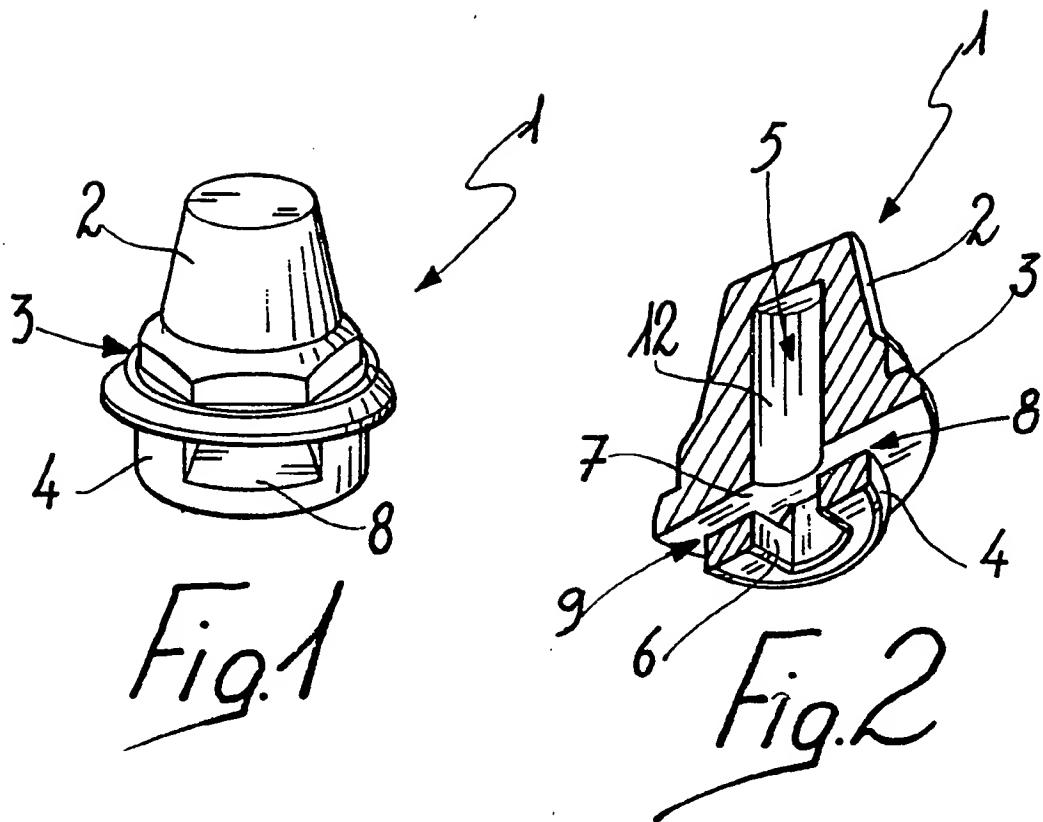


Fig.1

Fig.2

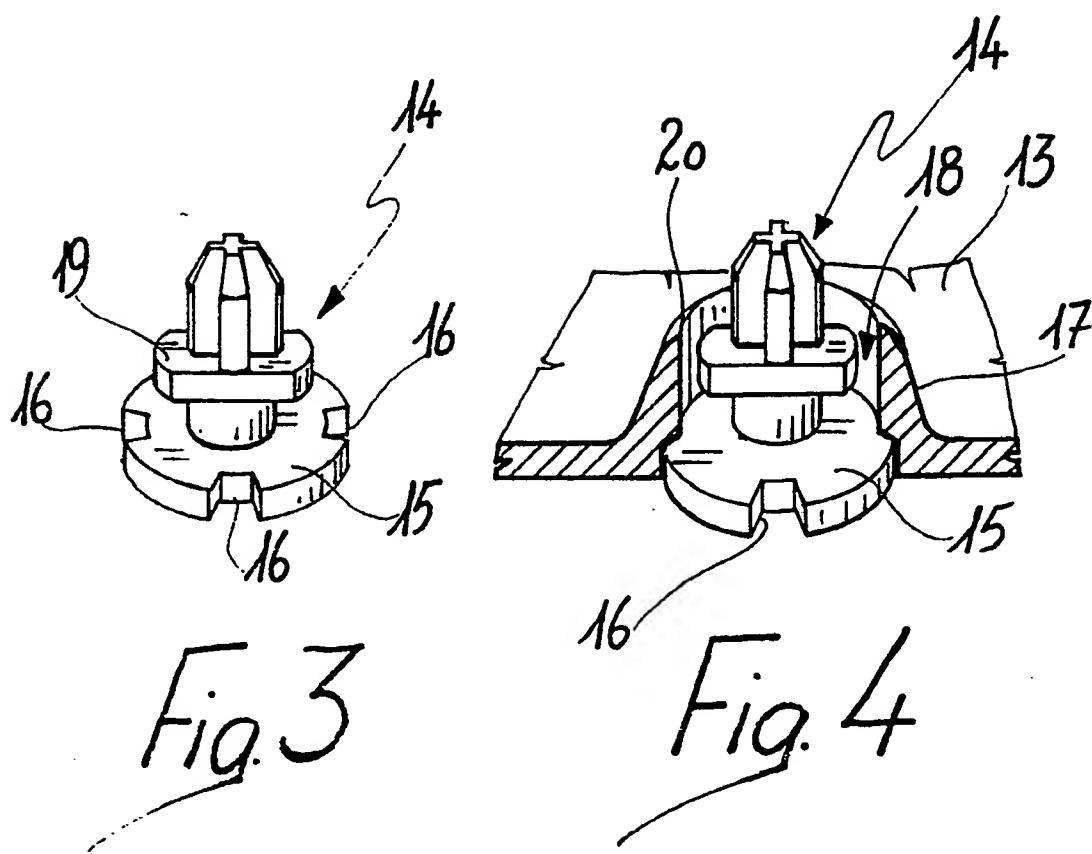


Fig.3

Fig.4

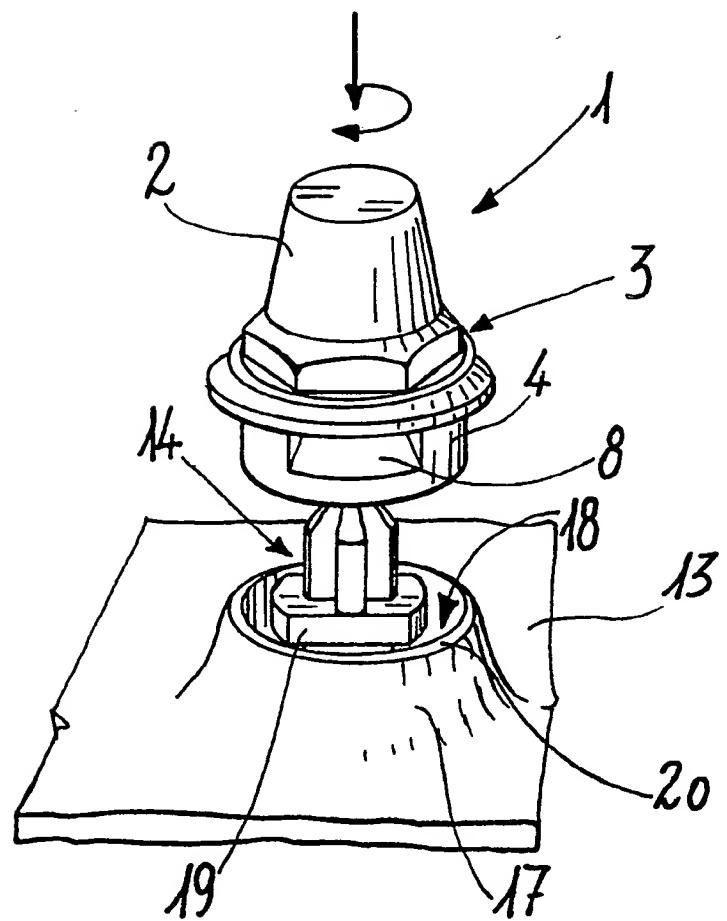


Fig. 5

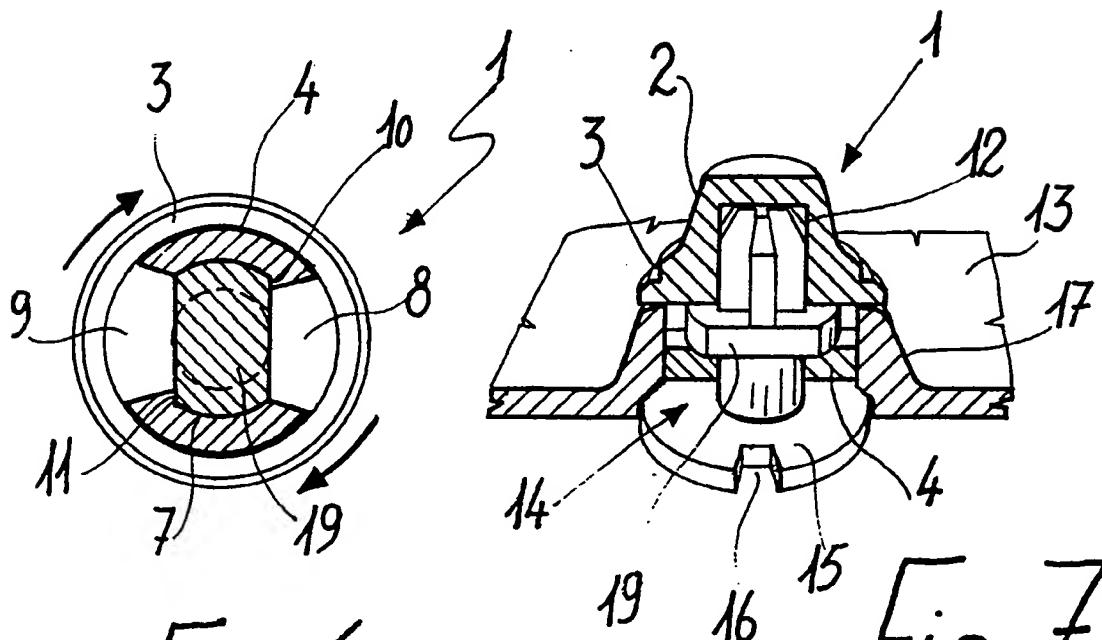
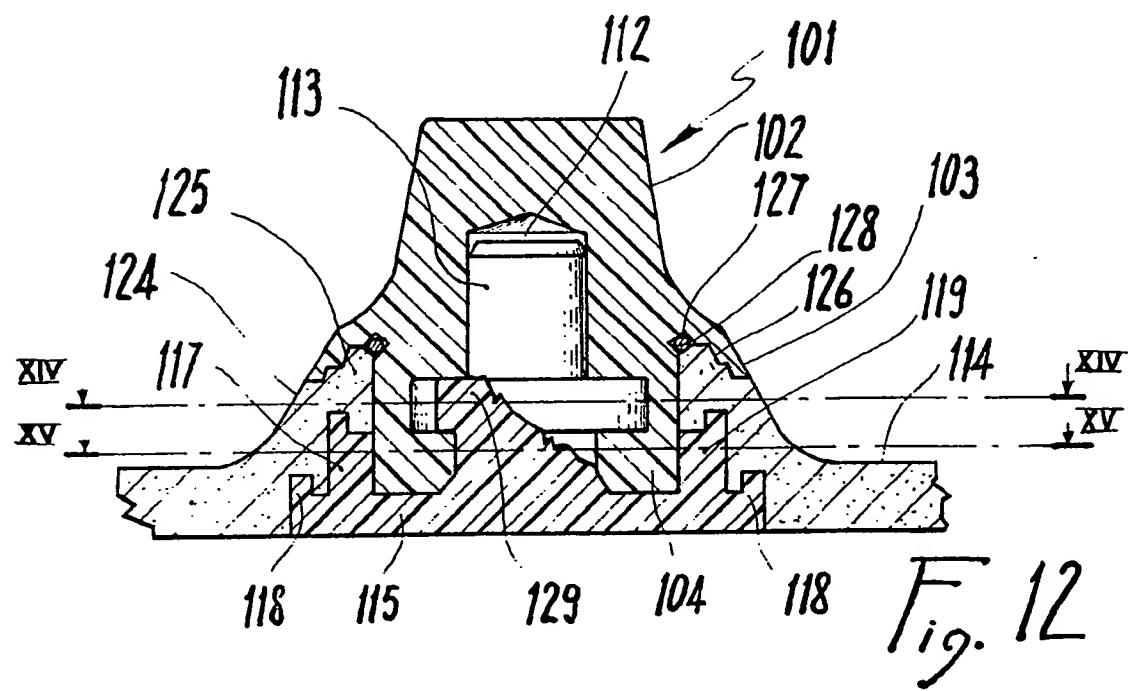
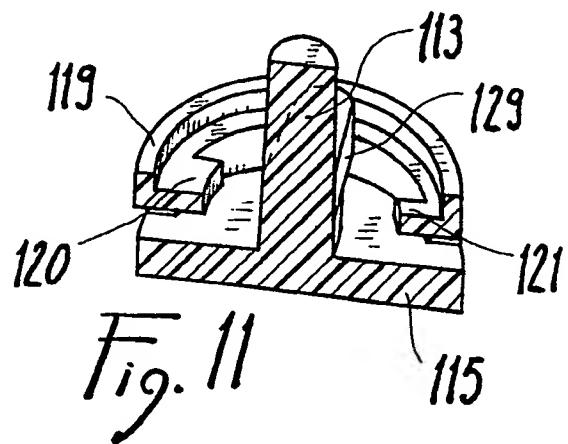
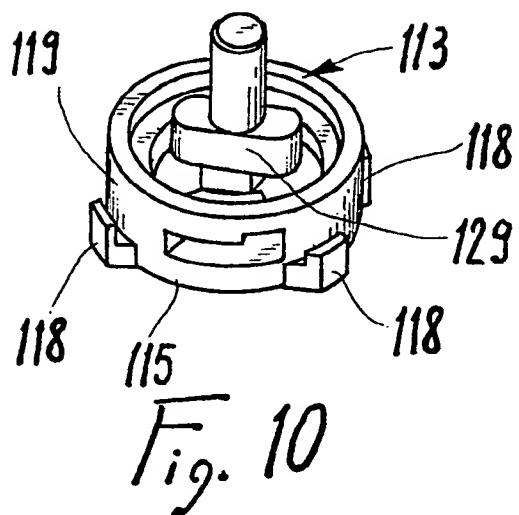
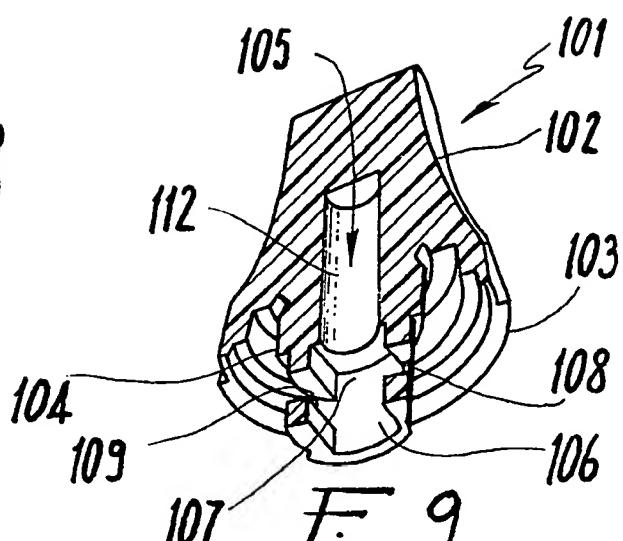
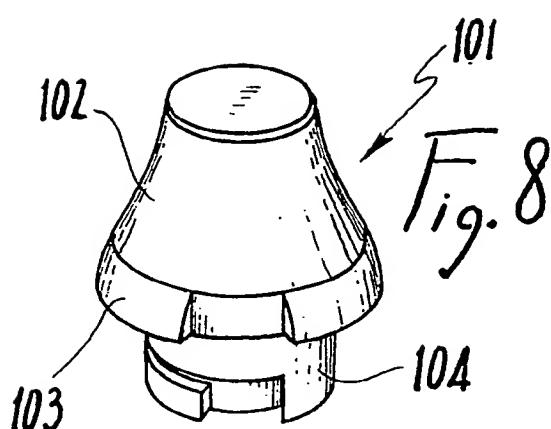


Fig. 6

Fig. 7



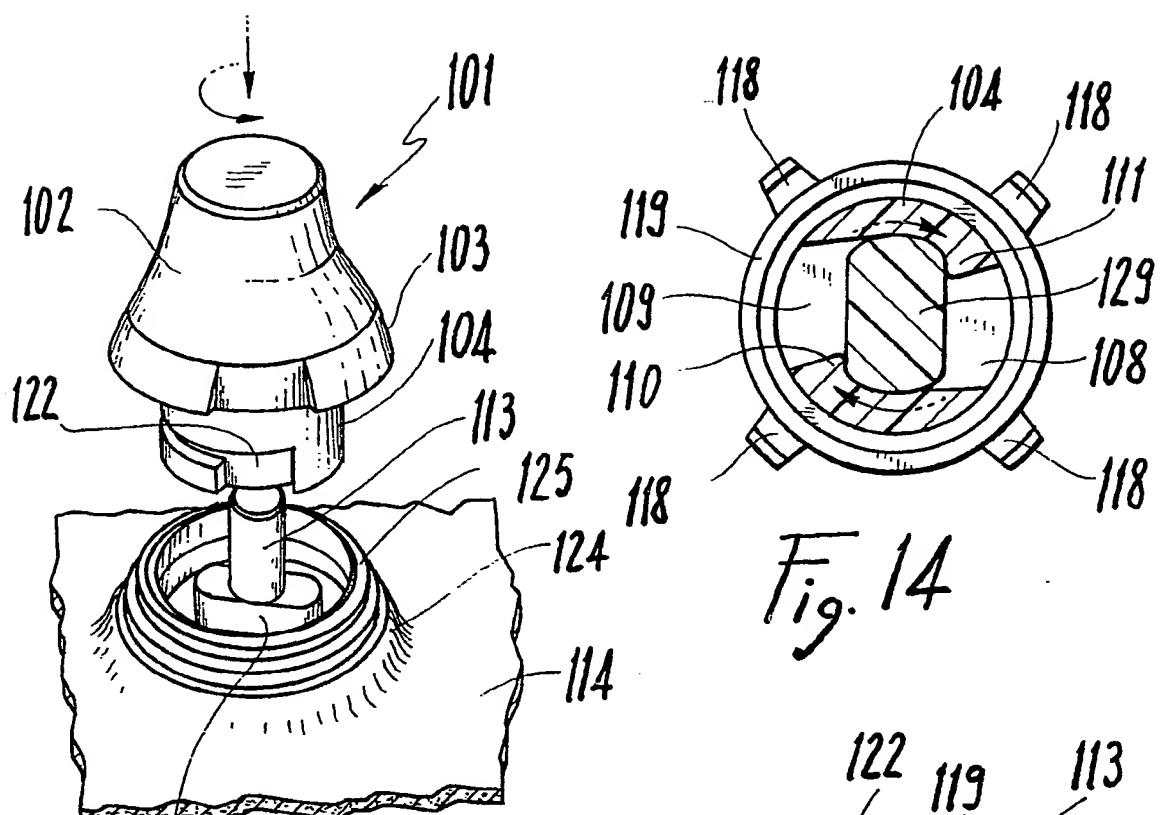


Fig. 14

Fig. 13

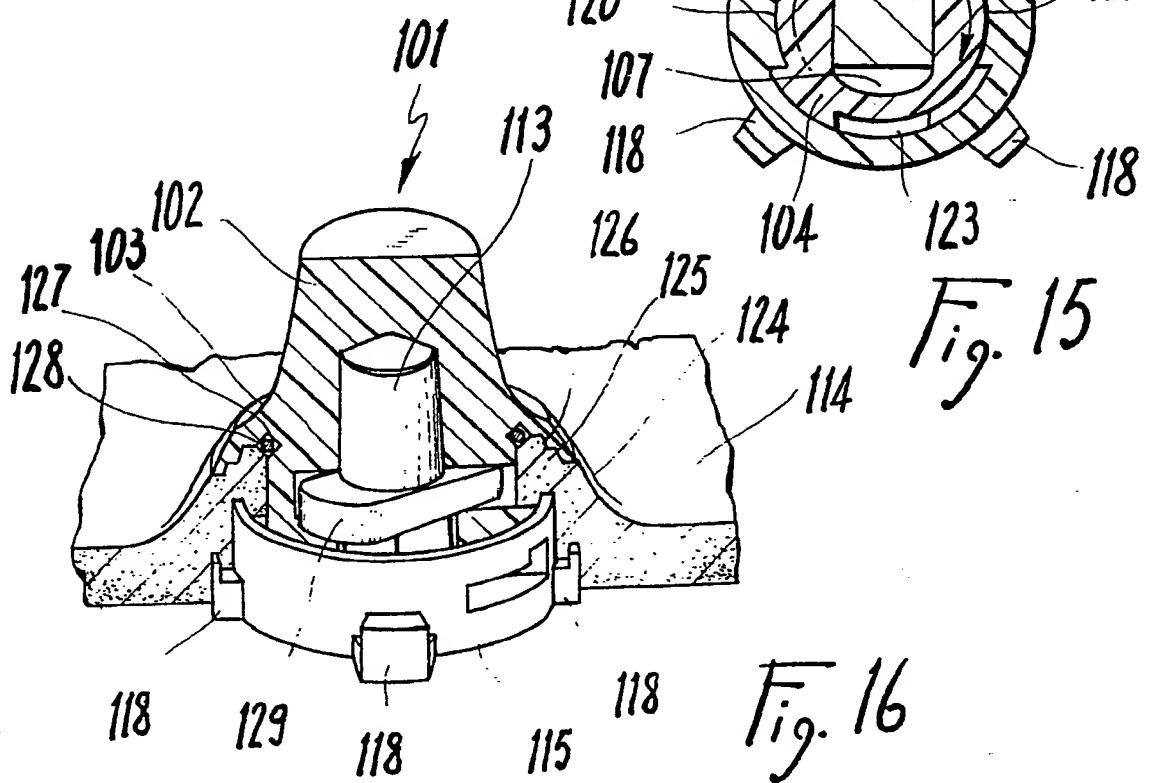


Fig. 15

Fig. 16



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EUROPEAN SEARCH REPORT

Application Number

EP 89 11 7254

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	DE-A-3 134 817 (KARL UHL) * Figures 5-6; claim 1, pages 6,10 * ---	1	A 43 C 15/16
A	EP-A-0 061 715 (W. FRÖR) * Figures 1-4; claim 1 * ---	1	
A	N.T.I.S. TECH NOTES, NASA TECH BRIEF, December 1986, page 1340, Springfield, VA, US; D.M. MOORE: "Quick-connect heavy-duty fastener" * Page 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 43 C A 43 B F 16 B
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search		Examiner
THE HAGUE	23-11-1989		VERMEESCH, P.J.C.C.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			